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FOLIAR NUTRITION FOR AUGMENTING GROWTH AND FLOWER YIELD OF GERBERA (GERBERA JAMESONII) VAR. ANKUR

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Abstract
Gerbera is an commercial flower crop produces very attractive flowers in various colours and ranked among the top ten cut flowers. It is also called Transvaal daisy, Barberton daisy or African daisy besides as a cut flower it is also very ideal for beds, borders pots. Growth regulators are used to overcome the factors limiting the growth and yield to harness maximum benefit. It is also observed that foliar application of growth regulators stimulates flowering to get maximum yield. In gerbera it stimulates cellular elongations, so without them, cells do not elongate much and plants do not grow tall. In this experiment, an attempt was made to find out the effect of certain new generation chemicals along with plant growth promoters (GA3 and Triacontanol), growth retardants (Maleic hydrazide, Alar), new generation stimulants (Campesterol +Stigmasterol) and organic supplements (Sea weed extract) on growth and yield of Gerbera. Humic acid was added to all the treatments as growth booster. The growth regulators were applied as foliar spray at 30 days after transplanting and continued at 30 days interval. Observations on various growth characters viz., plant spread, number of leaves, leaf length, leaf width, leaf area, flowering parameters viz., days to first flower emergence, number of flowers, flower diameter, stalk length, stalk diameter were recorded. From the experiment, it was concluded that, foliar application of GA3 @ 300 ppm along with Humic acid @ 2000 ppm was found to increase the growth and flower yield of Gerbera under poly house conditions
Keywords: Gerbera, growth regulators, growth retardants, sea weed etc

Introduction

Gerbera is an important commercial flower grown throughout the world. It is a perennial herb native to South Africa and Asia, belongs to the family Asteraceae. Gerbera produces very attractive flowers in various colours and ranked among the top ten cut flowers. It is also called Transvaal daisy, Barberton daisy or African daisy besides as a cut flower it is also very ideal for beds, borders pots and rock gardens. The demand of cut flower production in the country is increasing at a rapid pace, especially in winter when very few annuals bloom during that period. The use of plant growth regulators has brought a revolution in the floriculture industry and has been found to be of great significance in the commercial cultivation of many ornamental crops. Plant growth regulators play important role in cut flowers are applied to plants to regulate plant development and to stimulate a desired growth response. Hormonal balance plays a major role for flower yield like plant growth regulators increases growth, flowering and yield of many of the floriculture crops.

Growth regulators are used to overcome the factors limiting the growth and yield to harness

maximum benefit. It is also observed that foliar application of growth regulators stimulates flowering to get maximum yield. In gerbera it stimulates cellular elongations, so without them, cells do not elongate much and plants do not grow tall.

On the other hand Growth retarding chemicals at on optimum concentration improve the efficiency of the plants by modifying the various process such as photosynthesis, transpiration, photorespiration, water and nutrient uptake in a beneficial way. Many new generation growth stimulants are effective in enhancing the growth and development of crop plants. Campesterol +Stigmasterol is one of the compound widely used for promotion of growth and development. Nitrobenzene based flower booster, used in floriculture industry for yielding excellent quality flower. It ensures uniform and profuse flowering, increases in flowering rate and improvement in the yield of flower up to 20%-40 % (Shammy, 2009). There is increasing use of nitrobenzene compound as plant growth nutrient in recent era because it promotes flowering in plants and also prevents flower shedding. Nitrobenzene is a combination of nitrogen and plant growth regulators that act as plant energizers, flowering stimulants, and yield booster (Singh et al., 2015). With all these in view, an experiment was formulated to study the effect of growth stimulants and humic acid on the growth and flowering of gerbera.

Materials and Methods

In this experiment, an attempt was made to find out the effect of certain new generation chemicals along with plant growth promoters (GA3 and Triacontanol), growth retardants (Maleic hydrazide, Alar), new generation stimulants (Campesterol +Stigmasterol) and organic supplements (Sea weed extract) on growth and yield of Gerbera. Humic acid was added to all the treatments as growth booster. The growth regulators were applied as foliar spray at 30 days after transplanting and continued at 30 days interval. Observations on various growth characters viz., plant spread, number of leaves, leaf length, leaf width, leaf area, flowering parameters viz., days to first flower emergence, number of flowers, flower diameter, stalk length, stalk diameter were recorded.

Results and Discussion

Significant differences were noticed due to the application of growth stimulants through foliar spray. Plant spread was measured as a major vegetative growth parameter due to its rosette type of growth habit instead of plant height. Maximum plant spread (23.3, 25.7, 28.3, 28.2, 33.2 and 35.6 cm) was recorded in T3 (GA3 @ 300 ppm + HA @ 2000 ppm) at 30, 60, 90, 120, 150 and 180 days.

Increased plant spread might be due to quick cell multiplication and cell elongation due to higher concentration of GA3. The increase in plant height seems to be due to promotion of protein synthesis by GA3 application exogenously which might have resulted in enhanced vegetative growth (Girisha et al., 2012). These findings were in conformity with the findings of Nandre et al. (2009) on China aster, Baghele et al. (2012) in Rose, Rani and Singh (2013) in Tuberose and Raveendra et al. (2014) in Daisy.

Similarly, numbers of leaves have been considered as an important parameter which contributes

for the flowering mechanism of gerbera. The results showed that more number of leaves was observed in those plants received a foliar spray of GA3 @ 300 ppm + HA @ 2000 ppm (T3) with 7.98, 14.37, 17.08, 22.66, 27.17 and 30.18 leaves at 30, 60, 90, 120, 150 and 180 days respectively. Application of GA3 attributed production of more number of leaves at early stage of growth which than had sufficient time to accumulate carbohydrates. The production of more number of leaves per plant by GA3 might be due to rapid growth and differentiation. Similar findings with respect to difference in no. of leaves due to the application of GA3 was observed by Rani and Singh (2013) in Tuberose and Raveendra et al. (2014) in Daisy.

The size of the leaves is detrimental factor due to the length and width of the leaves. The quantum of photosynthates produced through the maximum surface of the leaves is very important. The data on leaf length recorded maximum values from the treatment T3 (GA3 @ 300 ppm + HA @ 2000 ppm) which recorded a leaf length of 13.61, 23.57, 29.27, 30.12, 31.64 and 36.65 cms at 30, 60, 90, 120, 150 and 180 days respectively. Similarly, those plants sprayed with GA3 @ 300 ppm + HA @ 2000 ppm (T3) recorded the maximum leaf width of 6.37, 11.56, 13.99, 14.4, 15.97 and 15.86 cms at 30, 60, 90, 120, 150 and 180 days of respectively. This resulted in producing maximum leaf area (212.3 cm2) observed under the treatment T3 (GA3 @ 300 ppm + HA @ 2000 ppm). Further, more leaf area in this treatment might be due to the combination of GA3 and humic acid which enhanced the cytokinin level and thereby cause manifold increase in cell division resulted in enhanced leaf area.

Earliness in flowering was recorded under the treatment T1 (Alar @ 1000 ppm + Humic Acid @ 2000 ppm) with 54.12 days compared with control (66.34 days). The early flowering due to the application of plant growth retardants might have been due to the fact that such plants have built up sufficient food reserves at initial stages. These reserve foods could have been utilized for the reproductive growth with a restriction in vegetative growth. A reduction in the level of endogenous gibberellin might be a prerequisite for floral induction which was achieved by the retardant sprays (Kumar and Haripriya, 2010). Similar findings were reported by Khan and Tewari (2003) in dahlia.

Among the treatments, maximum number of flowers (22.19) were recorded under the treatment T3 (GA3 @ 300 ppm + HA @ 2000 ppm). This might be due to enhanced induction of flower bud break i.e. differentiation of floral primordial in the apical growing region by GA3 which lead to increased production of flower per plant (Singh and Srivastava, 2008). This might be due to increase in cell elongation and rapid mobilisation and accumulation of metabolites which probably influenced floral morphogenesis thus render maximum flower per plant (Singh, 2004). GA3 induced promotion of flowering which due to increased synthesis as well as translocation of flowering hormone.

Interestingly, the data on flower diameter showed different results. Maximum flower diameter (11.78 cm) and stalk diameter (1.07 cm) was recorded under the treatment T2 (MH @ 500 ppm + HA @ 2000 ppm). This enlargement due to the application of growth retardant is caused by drawing of photo synthates to the flower as a consequence of intensification of the sink. Further, other scientists have reported suppression in vegetative parameters with the application of growth retardants but not on flowering parameters.

Among the treatments, the maximum flower stalk length (46.88 cm) was recorded under the treatment T3 (GA3 @ 300 ppm + HA @ 2000 ppm). Increase in stalk length with GA3 application can be attributed to active cell elongation in the flower to increase the sink strength of actively growing part. GA3 has reported to induce on entire development programme by activation of master regulatory gene in the later stage of corolla development which contributed to increased stalk length and maximum number of flowers per plant.

From the experiment, it was concluded that, application of GA3 @ 300 ppm + HA @ 2000 ppm through foliar spray at 30 days interval resulted in growth and yield enhancement in gerbera var.Ankur.

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Table.1. Effect of growth stimulants and Humic acid on growth and flower yield of Gerbera (Gerbera jamesonii) var.Ankur

T.no	Treatment details	Plant spread (cm)	Number of leaves	Leaf area (cm2)	Days to first flower	Number of flowers per plant	Flower diameter	Stalk length
T1	Alar @ 1000 ppm + Humic Acid @ 2000 ppm	32.4	27.04	185.42	86.77	20.56	11.46	43.59
T2	M H @ 500 ppm + Humic Acid @ 2000 ppm	32.7	27.40	189.07	88.31	20.76	11.78	44.54
T3	GA3 @ 300 ppm + Humic Acid @ 2000 ppm	35.6	30.18	212.3	89.89	22.19	11.29	46.88
T4	Triacontanol @ 1000 ppm + HA@ 2000 ppm	34.4	28.92	201.91	94.68	20.94	10.33	44.89
T5	Campesterol +Stigmasterol + HA @ 2000 ppm	35.2	29.76	208.73	91.44	21.79	10.95	46.14
T6	Nitrobenzene @ 2000 ppm + HA @ 2000 ppm	34.8	29.31	205.18	94.14	21.37	10.67	45.41
T7	Amino Acid @ 500 ppm + HA @ 2000 ppm	34.0	28.51	199.83	94.80	20.39	10.01	43.81

T8	Sea weed @2000 ppm + HA @ 2000 ppm	33.6	28.08	196.27	96.68	20.13	9.67	42.83
T9	Control	33.2	27.62	192.67	98.34	19.28	9.55	41.85
	SEd	0.17	0.20	1.69	0.81	0.20	0.15	0.36
	CD	0.36	0.40	3.4	1.64	0.40	0.31	0.72